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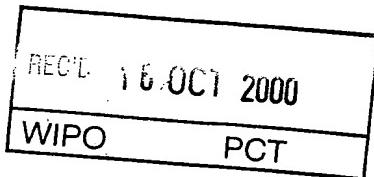
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04 OCT 1999

Cardiff Road  
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## 1. Your reference

REP06051GB

05OCT99 F481513-1 D02890

## 2. Patent application number

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9923424.7

P01/7700 0.00 - 9923424.7

3. Full name, address and postcode of the or of  
each applicant (underline all surnames)Freudenberg Ltd.P.O. Box 3  
Ellistones Lane  
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Halifax

West Yorkshire HX4 8NJ

Patents ADP number (if you know it)

United Kingdom

If the applicant is a corporate body, give the  
country/state of its incorporation

77562372C1-2

## 4. Title of the invention

NON-WOVEN ABRASIVE MATERIAL

## 5. Name of your agent (if you have one)

GILL JENNINGS &amp; EVERY

"Address for service" in the United Kingdom  
to which all correspondence should be sent  
(including the postcode)Broadgate House  
7 Eldon Street  
London  
EC2M 7LH

Patents ADP number (if you know it)

745002

6. If you are declaring priority from one or more  
earlier patent applications, give the country  
and the date of filing of the or of each of these  
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each application number

Country

Priority application number  
(if you know it)Date of filing  
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derived from an earlier UK application,  
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Number of earlier application

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to grant of a patent required in support of  
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YES

- a) any applicant named in part 3 is not an inventor
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Description 4

Claim(s) 1

Abstract

Drawing(s)

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination  
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Any other documents  
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11. For the Applicant  
Gill Jennings & Every

I/We request the grant of a patent on the basis of this application.

Signature

Date

4 October 1999

12. Name and daytime telephone number of person to contact in the United Kingdom

PERRY, Robert Edward  
0171 377 1377

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## NON-WOVEN ABRASIVE MATERIAL

Field of the Invention

This invention relates to non-woven abrasive materials.

Background to the Invention

5 Non-woven abrasive materials are well known in the art. Many of these articles are manufactured from polyamide fibres-(such as Nylon 6 or Nylon 66), and include a binder such as phenol-formaldehyde (PF) resin.

10 Most known abrasive products have sufficient integrity (defined by the tear strength of the material) that they retain a "sheet" type structure. That is, they have defined surfaces that may remain in the sheet shape when in use, such as for surface finishing and cleaning. Products that do not have such integrity tend to be too coarse (e.g. wire wool) or too soft (such as cotton wool). Other products may be solid (such as a pumice or sandpaper).

Summary of the Invention

15 According to a first aspect of the present invention, an abrasive material comprises non-woven, synthetic fibres, and can be separated in user-defined quantities.

According to a second aspect of the present invention, an abrasive material comprises non-woven, synthetic fibres, does not have a planar surface.

20 According to a third aspect of the present invention, an abrasive material comprises non-woven, synthetic fibres, and has substantially the same tear strength in all directions.

According to a fourth aspect of the present invention, an abrasive material comprises non-woven, synthetic fibres, and is disclosed, wherein the material is not needed.

According to the present invention, an abrasive material has a low enough strength to allow it to be separated into the desired quantity, and a high enough strength to maintain a wad of material as such, when in use.

Description of the Invention

30 The novel non-woven abrasive material of the present invention may be manufactured from components typically found in conventional non-woven materials. For example, it may be made from Nylon 66, in combination with PF resin, or from polyester with acrylic binder.

The novel material has a number of physical characteristics and properties that differ from known materials.

In particular, the material can be torn apart, as wads, and also shaped, or "crumpled", into a desired form. After such shaping, the product does not have a planer surface and, unlike conventional products, cannot easily be converted back into its previous form.

The ease with which the material may be torn apart and, in particular, that there is no "directional influence" on the tearing, means that the material may be separated in user-defined quantities. By "no directional influence" is meant that there is no difference in the force required to tear one part of the product from that required to tear any other part. This is a significant improvement, as conventional materials are provided in manufacturer-defined quantities.

The desired properties may be achieved as a result of the manufacturing process. Accordingly, a novel process for the production of a non-woven, synthetic, abrasive material comprises the steps of:

- (i) separating and blending fibres;
- (ii) carding and cross-laying the fibres to form a fleece;
- (iii) spraying the resulting fleece with a slurry containing abrasive grain and binder; and
- (iv) drying and curing the binder in an oven.

It will be obvious to one skilled in the art that alternative methods of preparing non-woven abrasive materials are known. For example, air-laying may be used, instead of carding.

The following examples illustrate the invention. A light-weight abrasive (LWA) is constructed from three elements, using the above-described process. In particular, fibres have been used having a fibre weight of between 20 and 70 g/m<sup>2</sup> binders have been used with a binder weight of between 20 and 40 g/m<sup>2</sup>, and abrasive grains have been used having a weight of between 15 and 60 g/m<sup>2</sup>.

More particularly, the fibres are PA66 and polyester. It is understood that any synthetic staple fibre may be used, dependent upon the desired use of the product and the binder system employed. 17 denier fibre is used. It is understood that fibre deniers of between 5 and 200, or combinations thereof, may be used, dependent upon process and also product performance requirements. The fibres used have

staple lengths of about 60 mm. It is understood this may vary, dependent on product performance and process requirements.

The binders used are aqueous phenolic resin, in combination with PA66 fibres, and acrylic binders in combination with polyester fibres. Again, dependent upon product application and process requirements, any binder system may be employed, for example, epoxy's-SBR or polyurethane.

The abrasive grains used are aluminium oxide and fused alumina silicate. It is understood that other abrasives, such as silicon carbide, may be used, dependent upon the desired performance characteristics of the product. The size of the abrasive grain used is 180 and 320 grit. It is understood that any size, or combination thereof, of grains between 36 and 1800 grit may be used. Combinations of components are summarised in Table 1.

Table 1

| 15 | Fibre type/denier/length | Fibre wt. (g/m <sup>2</sup> ) | Spray wt. (g/m <sup>2</sup> ) | Grit type/size | Grit wt. (g/m <sup>2</sup> ) | Binder  |
|----|--------------------------|-------------------------------|-------------------------------|----------------|------------------------------|---------|
| 20 | PA 66                    | 70                            | 20                            | Fused          | 15                           | PF      |
|    | 17 dtx/60mm              | 60                            | 25                            | Alumina        | 19                           |         |
|    |                          | 50                            | 30                            | Silicate/      | 23                           |         |
|    |                          | 40                            | 40                            | 320            | 30                           |         |
|    |                          | 30                            | 60                            |                | 45                           |         |
|    |                          |                               | 80                            |                | 60                           |         |
| 25 | Polyester s              | 30                            | 60                            | Fused          | 50                           | Acrylic |
|    | 17 dtx/63mm              | 20                            | 20                            | Alumina        |                              |         |
| 30 | PA66*                    | 30                            | 30                            | Silicate/      |                              | PF      |
|    | 17 dtx/60mm              |                               | 80                            | 320 & 180      |                              |         |
|    |                          |                               |                               |                |                              |         |
| 35 |                          |                               |                               | Fused          | 22                           | PF      |
|    |                          |                               |                               | Alumina        | 60                           |         |
|    |                          |                               |                               | Oxide 320      |                              |         |

LWA's of the present invention may have significantly lower tensile strengths and fleeced and finished weights, as shown in Table 2.

Table 2

|   | Tensile strength (length) (N/50 mm) | Tensile strength (length) (N/50 mm) | Tear strength (N) | Fleece weight (g.m <sup>-2</sup> ) | Finished weight (g.m <sup>-2</sup> ) |
|---|-------------------------------------|-------------------------------------|-------------------|------------------------------------|--------------------------------------|
| 5 | LWA                                 | 5.5                                 | 4                 | 1.7                                | 30                                   |
|   | Freudenberg 4639                    | 30                                  | 60                | 12                                 | 70                                   |

Materials of the present invention are useful in a number of applications, for example, where a deformable abrasive material is required. They also allow for alternative methods of delivery to a user, such as pinch extraction from a box or sleeve. In this way, the user may control the quantity of material dispensed for each application.

CLAIMS

1. An abrasive material comprising non-woven, synthetic fibres, which can be separated in user-defined quantities.
2. An abrasive material comprising non-woven, synthetic fibres, which does not have a planar surface.
3. An abrasive material comprising non-woven, synthetic fibres, which has substantially the same tear strength in all directions.
4. An abrasive material comprising non-woven, synthetic fibres, which is not needled.
5. An abrasive material according to any preceding claim, wherein the abrasive is in the form of grains which are held in the material by a resin or other binder.
6. A method of abrading a surface, which comprises contacting the surface with a wad of an abrasive material according to any preceding claim, wherein the wad is obtainable from a larger mass of the material having a sufficiently low strength to allow it to be separated into the wad, of a desired quantity, and a sufficiently high strength to maintain the wad of material when in use.

Gin Jennings et al.

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4/10/2000.